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**PATENT ABSTRACTS OF JAPAN**

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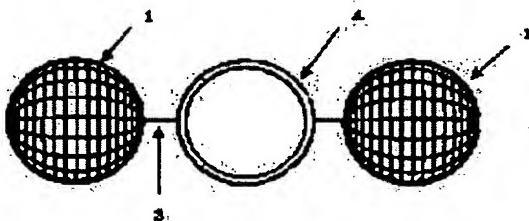
(71)Applicant : YOKOKURA SEIJI  
YOKOZAWA HIROSHI

(22)Date of filing : 29.05.2002

(72)Inventor : YOKOKURA SEIJI  
YOKOZAWA HIROSHI**(54) WATER QUALITY IMPROVER AND METHOD FOR IMPROVING WATER QUALITY****(57)Abstract:**

**PROBLEM TO BE SOLVED:** To obtain a lightweight and inexpensive water quality improver easy to handle and to provide a method for improving water quality using the same.

**SOLUTION:** The water quality improver obtained by housing a functional part 2 comprising a porous material and/or a filler in a skeletal part 1 forming a water permeable shell is put in rivers or water areas such as lakes, marshes or ponds to improve the water quality. A zeolite, activated carbon, charcoal, Kanuma earth (granular soil for horticulture produced in Kanuma district in Tochigi prefecture, Japan), diatomaceous earth or lapilli may be used as a material housed in the functional part 2 and microorganisms or aquatic plants and animals may be added to the material. A biodegradable material is preferably used as the material of the skeletal part 1. A buoyant body 3 may be disposed.

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**CLAIMS**

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**[Claim(s)]**

[Claim 1] Water quality improvement material which comes to hold the function part which becomes the frame circles which form the outer shell which has water flow nature from a porous material and/or a filler.

[Claim 2] Water quality improvement material according to claim 1 characterized by said frame section being a biodegradability ingredient.

[Claim 3] Water quality improvement material according to claim 1 or 2 characterized by fixing a microorganism to said function part.

[Claim 4] Water quality improvement material given in any 1 term of claims 1-3 characterized by having more than a kind as which said function part is chosen from the seed, seedling, and adult of a hydrophyte.

[Claim 5] Water quality improvement material given in any 1 term of claims 1-4 characterized by having more than a kind as which said function part is chosen from the egg and adult of an aquatic animal.

[Claim 6] Water quality improvement material given in any 1 term of claims 1-5 characterized by establishing a buoyancy object further.

[Claim 7] Water quality improvement material which comes to connect two or more water quality improvement material of a publication with any 1 term of claims 1-6.

[Claim 8] The water quality improvement approach characterized by supplying water quality improvement material given in any 1 term of claims 1-7 underwater, and improving water quality.

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## DETAILED DESCRIPTION

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### [Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the water quality improvement material and the water quality improvement approach for improving the water quality of water areas, such as a river or a lake, a swamp, and a pond.

[0002]

[Description of the Prior Art] As an approach for improving the water quality of water areas, such as a river or a lake, a swamp, and a pond, conventionally, the aeration method, the biofilm process, the soil trench method, the vegetable planting method, etc. are adopted. However, although disassembly of the organic substance was expectable in the water quality catharsis using an aeration method or a biofilm process, removal of the nitride or phosphoric acid leading to a water-bloom etc. was not completed, and since very large-sized equipment was needed for improving the water quality of a river, a lake, etc. using these approaches, costs for reservation of the installation of equipment to install equipment in a difficult top also had the fault of becoming high.

[0003] Moreover, in the thing using vegetation, disassembly of the organic substance could not be expected and had the problem that vegetable care and cleaning took time and effort. Furthermore, although the water quality catharsis by the soil trench method is performed in order to solve the above-mentioned problem, there is a problem that there are extremely few amounts of the water which can be processed since water flow nature is bad. Moreover, the present condition is that there is still no simple water quality improving method for the water in the loose locations (stagnation etc.) of the flow which a pollutant tends to accumulate especially in a river.

[0004]

[Problem(s) to be Solved by the Invention] This invention is aimed at offering the water quality improvement approach it being lightweight and cheap and using water quality improvement material and this with easy handling in view of the fault which the above-mentioned conventional technique has. Moreover, this invention sets it as other purposes to offer the water quality improvement approach that water quality is effectively improvable also to the water in the part where the water of a river tends to stagnate. Furthermore, this invention aims at offering water quality improvement material which the water quality improvement material itself does not bring environmental contamination.

[0005]

[Means for Solving the Problem] In order to solve the aforementioned technical problem, this invention has the next configuration.

(1) Water quality improvement material which comes to hold the function part which becomes the frame circles which form the outer shell which has water flow nature from a porous material and/or a filler.

(2) Water quality improvement material given in the above (1) characterized by said frame section being a biodegradability ingredient.

(3) The above (1) characterized by fixing a microorganism to said function part, or water quality improvement material given in (2).

(4) Water quality improvement material given in above-mentioned (1) - (3) characterized by having more than a kind as which said function part is chosen from the seed, seedling, and adult of a hydrophyte.

[0006] (5) Water quality improvement material given in above-mentioned (1) - (4) characterized by having more than a kind as which said function part is chosen from the egg and adult of an aquatic animal.

(6) Water quality improvement material given in above-mentioned (1) - (5) characterized by establishing a buoyancy object further.

(7) The above (1) Water quality improvement material which comes to connect two or more water quality improvement material of a publication with - (6).

(8) The above (1) The water quality improvement approach characterized by supplying water quality improvement material given in - (7) underwater, and improving water quality.

[0007]

[Embodiment of the Invention] Although it is the following and the gestalt of concrete operation of this invention is explained to a detail based on a drawing, the technical range of this invention is not limited at all by these examples.

[0008] Drawing 1 is drawing showing an example of the water quality improvement material of this invention. Water quality improvement material consists of the frame section 1 which forms the outer shell of water flow nature, and a function part 2 which consists of a porous material held in the interior of this frame section 1. The frame section 1 is reticulated or has hole vacancy-like structure so that water may be able to contact a function part 2. The whole appearance configuration As what kind of configuration is sufficient as long as it can hold a function part 2 in the interior, for example, shown in drawing 1 Using a reticulated ingredient, it can consider as the thing of various kinds of configurations, such as the shape of globular form (a), an ellipse ball (b), a cube (c), a rectangular parallelepiped (d), a cylinder (e), and a cone (f), and it may replace with a reticulated ingredient, and the ingredient which was made to penetrate and prepared the hole may be used. The magnitude of the appearance configuration of water quality improvement material is 2-20cm preferably that a diameter or one side should just be about 0.5-60cm.

[0009] Moreover, as shown in drawing 2 , with the connection implement 3, plurality may be connected and each water quality improvement material may be used for the water quality improvement material of this invention, and it forms the buoyancy object 4 in the exterior of the frame section 1, and you may make it make the water surface or underwater float, as shown in drawing 3 .

Moreover, such a buoyancy object 4 may be formed in the interior or the exterior, and the exterior of the frame section 1.

[0010] It is [011] which can use the carbon material illustrated by metals and carbon fibers, such as the synthetic resins illustrated as an ingredient which forms the frame section 1 with the rubber illustrated, for example by isobutylene isoprene rubber, silicone rubber, polyurethane rubber, ethylene rubber, the fluororubber, acrylic rubber, natural rubber, regenerated rubber, etc., polyethylene, polypropylene, polyvinyl acetate, a vinyl chloride, a polycarbonate, polyurethane, etc., aluminum, iron, stainless steel, copper and brass, and can use these mixture and composites. Moreover, a biodegradability ingredient can be used as an ingredient which forms the

frame section 1. A biodegradability ingredient is an ingredient with the property for it to be decomposed by the activity of physiological active substances, such as an enzyme which a microorganism or a microorganism produces, and to vanish the gestalt, in order that the frame section may disappear by the passage of time by using this as an ingredient of the frame section, the ingredient of the frame section is accumulated in an environment and an environmental pollution problem is not caused. Moreover, when establishing a buoyancy object, also as for this buoyancy object, forming from a biodegradability ingredient is desirable.

[0012] As such a biodegradability ingredient, a biodegradable plastic, thermoplastics-starch mixture, and thermoplastics-chitin or chitosan mixture, such as synthetic polymers, such as what processed microorganism production resin, such as bacteria, and animal or vegetable naturally-occurring polymers, and polylactic acid, etc. can be raised. Moreover, an ingredient, a process condition, the thickness of an ingredient, a moisture content, etc. can adjust the rate of decomposition by the microorganism to some extent. Moreover, the gestalt and/or configuration of an ingredient of a function part 2 which are put into the interior adjust suitably the opening of the frame section 1, or the magnitude of a hole.

[0013] One sort or two sorts or more of porous materials chosen from the group illustrated by carbon materials, such as silicate minerals, such as a zeolite, activated carbon, and charcoal, Kanumatsuchi, diatomaceous earth, a lapillus, etc. as a porous material which constitutes a function part 2 can be used, and these baking objects can also be used. Moreover, the following can be used if it considers as the ingredient which constitutes function parts 2 other than the above-mentioned porous material. Artificial soil, such as peat-moss, a vermiculite, and industrial waste activity soil. Quality of a vegetable fiber, such as wood fiber, a seed fiber, coconut fiber, hemp, a hemp palm, chaff, soybean cake, and coffee \*\*. Quality of an inorganic fiber, such as quality of a synthetic fiber, such as nylon, polyethylene, and polypropylene, and rock wool fiber, a glass fiber, and ceramic fiber Resin, such as a cellulosic, polycarboxylic acid system resin, polyacrylate system resin, polyurethane system resin, an acrylic-acid graft polymer, and polyvinyl alcohol Sugar, such as protein, starch, a starch derivative, an agar, pectin, a carrageenan, a cellulose, guar gum, and pulp These ingredients are called "filler" on these specifications. The ingredient of these function parts 2 may blend and use binders, such as various resin latexes and biodegradation student resin, if needed, and the addition is suitably adjusted according to the environment where the water quality improvement material of this invention is constructed.

[0014] The operation effectiveness of the water quality improvement material of this invention is explained below. The porous material which constitutes a function part 2 has the operation which carries out adsorption treatment of an underwater pollutant and harmful matter, and improves water quality. Moreover, the frame section 1 has the operation from which this is protected from damage by the impact or friction by covering the function part 2 which is contents. That is, when it supplies to a river, although the water quality improvement material of this invention is in a suspension condition, or rolls in connection with the flow of water, flows down a river and collides with obstructions, such as rock of a surface of a river or river bottom, and a stone, in that case, in order that the frame section 1 may protect contents even in this case, contents break or it does not dissipate. Furthermore, when aquatic life animals and plants etc. are put into a function part 2, the frame section 1 also has the operation which protects a function part 2 from the vermin damage by the animal, an insect, etc.

[0015] Since a porous material and/or a filler become the good floor of effective microorganisms, after supplying to a river etc., a microorganism is automatically incorporated with this porous material and/or a filler, and they are effective in water quality being improved by this microorganism. Moreover, before the injection to a river, you may make it include a useful microorganism like a decomposition fungus in the porous material and/or filler of a function part 2 beforehand. The microorganisms which carry out such an operation are true fungi and bacteria, such as mold and an Actinomyces, and a water purification operation is continuously performed by the microorganism which settled in the porous material.

[0016] It is also possible to add aquatic life animals and plants etc. to a function part 2, and, thereby, pollutants, such as the organic substance, a nitride, and a phosphoric acid, can be removed. When adding a hydrophyte, any one or more sorts of the seed of a hydrophyte, a seedling, and the adult can be added to a function part 2, and when adding an aquatic animal, the egg or adult of an aquatic animal can be added. Moreover, a hydrophyte and an aquatic animal can be made intermingled and it can also add. As a hydrophyte, a water hyacinth, a reed, SUGINAMO, a bladderwort, BAIKAMO, a hornwort, etc. can be fried. As an aquatic animal A walnut guy, SHIWARO mume fructus, FUNEGAI, a sea mussel, a bush warbler guy, a mull roller screen guy, OONOGAI, UMITAKEGAIMODOKI, a tooth shell, Hyriopsis, Semisulcospira, Shellfish, such as ISHIGAI, DOBUGAI, a crow guy, a freshwater clam, and a freshwater snail, ITOMIMIZU, Mollusca, such as Ms. [ abb lamination ], an OYOGI earthworm, a leech earthworm, NAGAMIMIZU, a string earthworm, ERAMIMIZU, ITOGOKAI, a sand worm, and a leech, are raised, and zooplanktons, such as yarn-like algae, and MIJINKO, WAMUSHI, can be raised as still minuter aquatic life animals and plants.

[0017] Since it is lightweight, the water quality improvement material of this invention is easy to manufacture while having above simple configurations and structures, and since the internal function part 2 is held by the outside frame section 1 and there is no possibility that function parts 2 may be scattered about, it becomes possible [ throwing in a river etc. as it is ]. Furthermore, since it can flow at the valley where it moved automatically in connection with the flow of water, and a stream is weak, water has stagnated, and water quality is deteriorating comparatively automatically and can arrive at it after throwing in a river etc. by making water quality improvement material into the configuration which is easy to roll, water quality purification of the purpose part can also be performed easily.

[0018]

[Example] The spherical water quality improvement material whose diameter is 10cm was produced using a zeolite and activated carbon as a porous material of a function part using vinyl acetate as an ingredient of the [example 1] frame section. the stream which contains cadmium (100 mg/L) for this -- when put into inside, the underwater cadmium content fell to 72 mg/L in 24 hours.

Using a bamboo as an ingredient of the [example 2] frame section, DOBUGAI was used for the function part and the spherical water quality improvement material whose diameter is 10cm was produced. the stream which adjusted the COD value for this to 20 mg/L -- when put into inside, the underwater COD value fell to 14 mg/L in 24 hours.

Using the biodegradability resin of an aliphatic series polyester system as an ingredient of the [example 3] frame section, chaff and ITOMIMIZU were used for the function part and the diameter produced the tabular water quality improvement material which attached the buoyancy object by 10cm. the stream made to generate a water-bloom (Anabaena origin) for this -- when it was made to float to inside, water-blooms decreased in number in 24 hours.

[Effect of the Invention] Since the water quality improvement material of this invention is a simple configuration, and can be produced at low cost, can be easily supplied to a river etc., since it is lightweight, and it can make a positive water quality improvement over a long period of time, it is suitable as water quality improvement material for purification of a water pollution region.

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## DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1] It is drawing showing an example of the appearance configuration of the water quality improvement material of this invention.

[Drawing 2] It is drawing showing the example of use of the water quality improvement material of this invention.

[Drawing 3] It is drawing showing other examples of use of the water quality improvement material of this invention.

[Description of Notations]

- 1 Frame Section
- 2 Function Part
- 3 Connection Implement
- 4 Buoyancy Object

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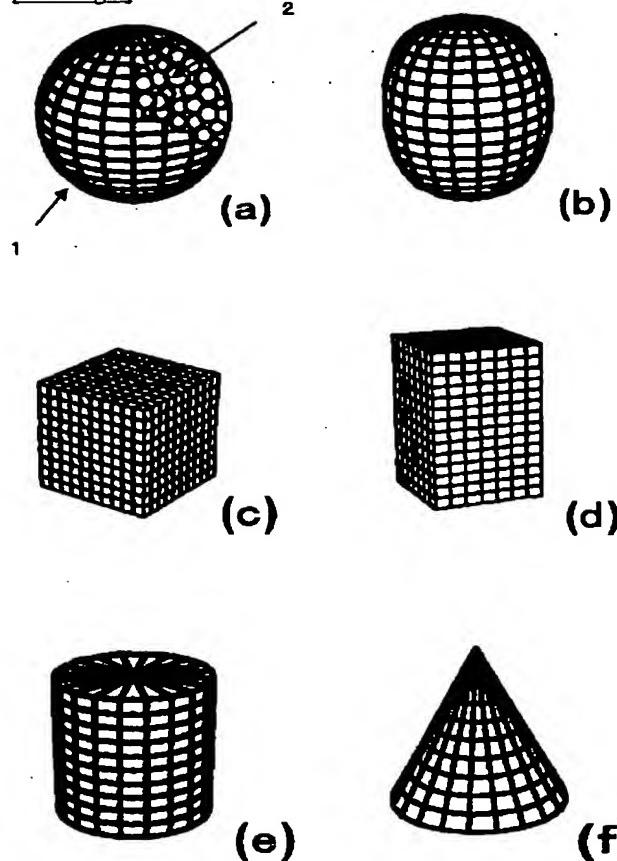
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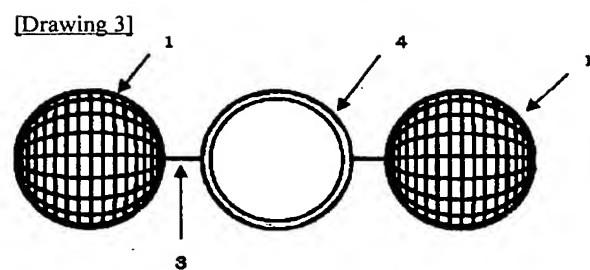
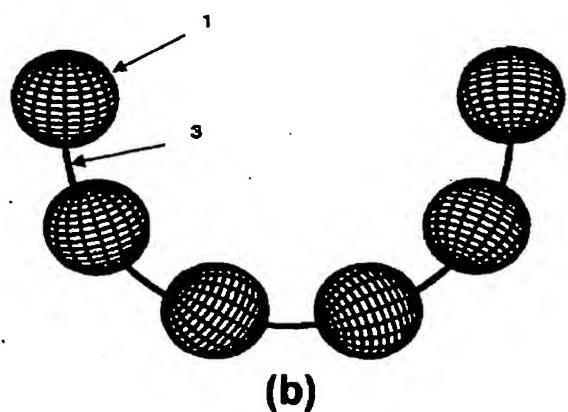
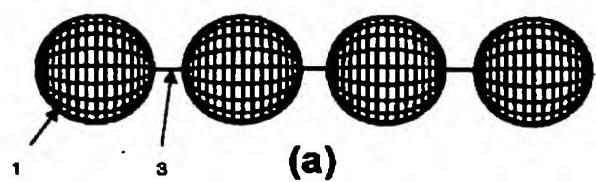
DRAWINGS

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## [Drawing 1]



## [Drawing 2]



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# PATENT ABSTRACTS OF JAPAN

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(21)Application number : 2001-143520 (71)Applicant : KANTO YAKIN KOGYO KK

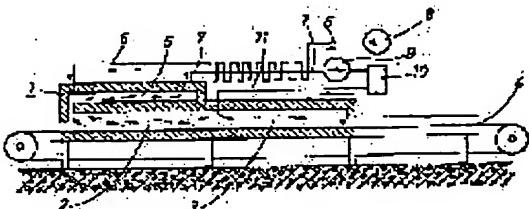
(22)Date of filing : 14.05.2001 (72)Inventor : TAKAHASHI SUSUMU

## (54) METHOD OF REMOVING AND UTILIZING ORGANIC EXHAUST GAS IN SINTERING FURNACE

### (57)Abstract:

**PROBLEM TO BE SOLVED:** To provide the method of removing and utilizing organic exhaust gas generated out of a body to be sintered, such as a metallic powder molded matter or the like, in the sintering furnace.

**SOLUTION:** The organic exhaust gas, generated out of the body to be sintered which passes through the sintering furnace 1 in which a preheating area 2 and a heating and sintering area 3 are connected, is guided into an exhaust gas processing chamber 5 other than the areas 2, 3, then, oxygen is added to the exhaust gas to oxidize and decompose them at 800° C or higher while the decomposed gas is sent again into the preheating area and/or heating and sintering area to utilize the same for the protective atmosphere of the same areas.



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(71) 出願人 000157072

関東冶金工業株式会社

神奈川県平塚市四之宮三丁目20番48号

(72) 発明者 高橋 進

神奈川県横浜市保土ヶ谷区新桜ヶ丘一丁目

12番地3

(74) 代理人 100078709

弁理士 浅賀 一樹

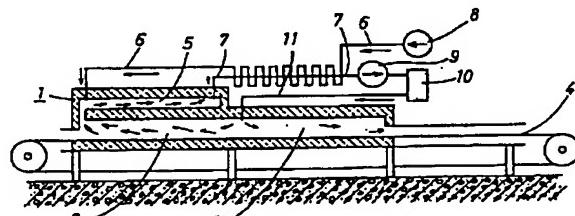
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(54) 【発明の名称】 焼結炉における有機質排気ガスの除去と利用法

(57) 【要約】 (修正有)

【課題】 焼結炉内で金属粉成型物等の被焼結体から発生する有機質排気ガスの除去とその利用法を提供する。

【解決手段】 予熱域2と加熱焼結域3とが連結した焼結炉1内を通る被焼結体から発生する有機質排気ガスを域外の排気ガス処理室5に導き、この排気ガスに酸素を加えて800°C以上の温度で酸化分解し、その分解ガスを予熱域及び/又は加熱焼結域に再度送ってその保護雰囲気として利用する、焼結炉における有機質廃棄ガスの除去と利用法。



## 【特許請求の範囲】

【請求項1】 予熱域と加熱焼結域とが連なる焼結炉を通る被焼結体からの有機質排気ガスをこれらの域外に導いて除去し、これに少なくとも酸素を加えて800°C以上の温度で加熱、酸化して所望の組成に分解し、この分解ガスを予熱域及び／又は加熱焼結域へ送って焼結炉の保護雰囲気として利用する焼結炉における有機質排気ガスの除去と利用法。

【請求項2】 分解ガスを脱水し、脱水後のガスは下記のいずれかの組成を含み、且つ各組成は下記の範囲内であることを特徴とする。

$\text{CO}_2$  : 0.5~19.0%,  $\text{H}_2\text{O}$  : 0.1~0.5%,  $\text{O}_2$  : 0.1~2.0%,  $\text{C}\text{O}$  : 0.1~8.0%,  $\text{H}_2$  : 0.1~8.0%,  $\text{CH}_4$  : 0.1~1.0%,  $\text{N}_2$  : 60.0~80.0% 請求項1記載の方法。

## 【発明の詳細な説明】

## 【0001】

【発明の属する技術分野】本発明は、焼結炉内で被焼結体を焼結のために熱前処理する時に生じる有機質排気ガスの除去と、その再利用方法にかかるものである。

## 【0002】

【従来の技術】金属やセラミックスの粉体を焼結するに当たり、この粉体を物理的に集合して成型するために、粉体の潤滑もしくは粉体間の隙間の充填等の働きをなす有機質が添加される。この有機質分は、被焼結体が耐熱性ベルト上に乗せられて焼結炉内を通過するときに、焼結に先立つ前駆工程で被焼結体から加熱されて除去される。

## 【0003】

【発明が解決しようとする課題】この種の焼結にはトンネル状の高温焼結炉が多用され、粉末成型体中の有機質添加物は、400°C付近の温度で蒸発もしくは分解され、排気ガスとして炉内雰囲気中に拡散する。このガスは毒性や腐食性をもつ物質を生成するために有害である。更にまた、この有機質の一部は炭素を傍生して被焼結体を汚染する。

## 【0004】

【課題を解決するための手段】そこで本発明では、炉内雰囲気中に拡散した有機質排ガスを、炉内雰囲気の一部と共に炉の予熱、焼結通路外に導き、そこで800°C以上の高温で酸化して、その有機質を水と炭酸ガスとに変えて無害化する。このようにして処理したガスを焼結炉内に送って、炉内雰囲気として利用する。

## 【0005】

【発明の実施の形態】フェノール系樹脂を含む有機質をバインダーとして33%含む金属粉成型物を、図1にて示されるトンネル状連続焼結炉1によって、毎時420kg/h熱処理した。炉内の予熱域2と加熱焼結域3を通過するための搬送は、耐熱鋼製のメッシュベルト4に乗せて連続して行った。図2にて示される通りに、予熱域2の温度を順次に上げて常温から720°Cとした。有

機質バインダーの多くは、400°C付近で蒸発または分解して有機質排ガスとして、金属粉成型物から離脱して図1中の矢印の如くに炉内雰囲気中に拡散した。有機質バインダーの一部は予熱域2内で炭素を傍生して、金属粉成型物を汚染したが、成型物が予熱域2を更に進むと、この炭素もより高温の雰囲気中の炭酸ガスや酸素や水蒸気によって、ガス体の一酸化炭素に変わって成型物から離脱して、成型物の汚染が除かれた。そこで、有機質の離脱処理を完了した成型物は、次の加熱域3へおくられて焼結された。

【0006】一方、炉内雰囲気に担持された有機質排ガスは、排ガス処理室5に送られる。この排ガス処理室は、炉1の入り口に隣接して予熱域2外に設けられ、温度850°Cで負圧下に保たれた。排ガス処理室5に吸引されたガスは、送風ポンプ8に連結され送風管6からの空気と共に加熱され、酸化し分解して、炭酸ガス、水分、一酸化炭素、水素、窒素、酸素を含む組成となつた。この組成と各組成の割合は、排ガス処理室へ送られる空気量、有機質排ガスと共に排ガス処理室へ吸引される炉内雰囲気の組成等によって選択的に調整することが出来た。因みに、予熱域2内の雰囲気は、金属粉成型物の金属粉末の所期酸化を低減するために、多量の酸素を含む空気をそのまま使用することなく、窒素ガスや炭酸ガスあるいは水蒸気を配合することが多い。

【0007】排ガス処理室5で処理された排出ガスは、導管7を通して、送風管6中の空気を暖めた後に脱水され、ガスポンプ9によってガス組成計器10を通り、管11によって炉内保護雰囲気として、加熱域及び／又は予熱域へと送られた。

## 【0008】

【発明の効果】処理室を通過した後に、脱水処理して得られた排出ガスの組成は、下記の範囲で制御可能で、焼結炉の炉内雰囲気として充分に用いることができた。

$\text{CO}_2$	.....	0.5 ~ 19.0%
$\text{H}_2\text{O}$	.....	0.1 ~ 0.5
$\text{O}_2$	.....	0.1 ~ 2.0
$\text{CO}$	.....	0.1 ~ 8.0
$\text{H}_2$	.....	0.1 ~ 8.0
$\text{CH}_4$	.....	0.1 ~ 1.0
$\text{N}_2$	.....	60.0 ~ 80.0

## 【図面の簡単な説明】

【図1】本発明の方法を実施するために好適なトンネル状の連続焼結炉の一例を示す説明的な断面図である。

【図2】同上の炉の炉内温度を示す模式図である。

## 【符号の説明】

- 1 - 焼結炉
- 2 - 予熱域
- 3 - 加熱焼結域
- 4 - メッシュベルト
- 5 - 排ガス処理室

6 - 空気導管

7 - 排ガス導管

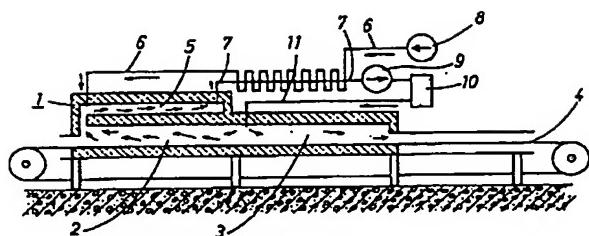
8 - 空気ポンプ

\* 9 - ガスポンプ

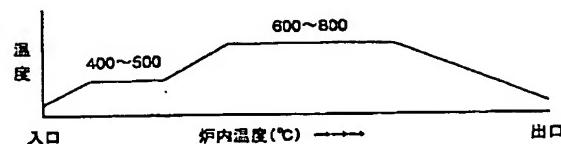
10 - ガス組成計器

\* 11 - 雾囲気ガス管

【図1】



【図2】



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